

ON A FURTHER COLLECTION OF SLUGS FROM THE HAWAIIAN
(OR SANDWICH) ISLANDS.

By WALTER E. COLLINGE, F.Z.S., etc.,

Assistant Lecturer and Demonstrator in Zoology and Comparative
Anatomy, Mason University College, Birmingham.

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IN the early part of 1896 I communicated a paper¹ to this Society upon a collection of slugs made by Mr. R. C. L. Perkins in the Sandwich, or Hawaiian Islands, for a Joint Committee of the Royal Society and British Association. A further collection has recently been received and handed to me for identification.

In the present collection there is a far larger number of specimens of each species, and they are all in a much better state of preservation than those previously described.

In my earlier paper I briefly reviewed the literature and gave a list of the species of slugs that have been recorded from these islands. I am now able to supplement the same by the addition of three species, two of which are new.

For some time I was undecided whether or not to separate *Amalia Babori* from *A. gagates*, Drap.; and *Agriolimax Bevenoti* from *A. levis*, Müll. In all probability the former developed from *Amalia gagates*, and the latter from *Agriolimax levis*. Each has become modified in certain features, due probably to isolation and habitat, but as these features will in all probability become more and more pronounced and permanent in the race occupying the Sandwich Isles, it is better, I think, to separate them as distinct species.

In my previous paper (t.e., p. 49) I called attention to, and figured, some slight differences in specimens of *Amalia gagates*, from Maui (cf. Figs. III, IV, and V, p. 48). An examination of the present collections from Haleakala convinces me that there are three distinct groups of this form in these islands, viz.:

Amalia gagates, Drap.

Amalia gagates, var. (as figured), from Maui.

Amalia Babori, n.sp.

The specimens of *Agriolimax* here described, which have probably all originated from *A. levis*, Müll., exhibit a similar variability. Thus, in a collection from Kauai (2,000 feet) most of the specimens may be regarded as *A. levis*, Müll., those from Kauai (4,000 feet) as *A. Bevenoti*, n.sp., while others from Haleakala (5,000 feet), mountains

¹ Proc. Malac. Soc., Vol. ii (1896), pp. 46-51.

near Honolulu (2,000 feet), and some collected between Olaa to Kilauea (2,000 to 4,000 feet), exhibit numerous minute variations in the form and position of the generative organs, which tend to make identification a very difficult matter. Some of these variations I have figured (Figs. 2, 3, and 8), and in all probability there are many more.

In dealing with these small specimens of *Amalia* and *Agriolimax*, I have been much impressed with the little value that can be attached to external features, especially in these two particular genera. Anyone examining the material I have had, and relying upon purely external features, will be able to endow the Sandwich Isles with numerous new "species" of both *Amalia* and *Agriolimax*, since forms in which the generative organs are almost identical exhibit differences in the colour, markings, length and breadth of the mantle, nature of the sulci, and form of the rugæ, to such an extent that any diagnosis based solely on these features would be worthless. So closely allied are many species of these two genera, while others are connected by intermediate forms or subspecies, that I have come to the conclusion that in addition to descriptions and figures of the generative organs, which are sufficient for specific determination in most genera, it is very desirable that some other organs should be figured and described—the alimentary or nervous systems, I would suggest—in addition to the form, origin, and insertion of the buccal, penial, and tentacular retractor muscles. These, and all other features, would be of much greater value if described from freshly-killed animals; for the specialist, who very often is compelled to examine only material which has for many months been in alcohol, works at considerable disadvantage, especially in the case of these minute forms.

1. AMALIA BABORI, n.sp.

Animal.—Anterior portion of head, mantle and dorsum, dark sepia, sides of body nearly as dark posteriorly, much lighter anteriorly, also in the region bordering the front and sides of the mantle; portion beneath the mantle yellowish-brown; mantle (Fig. 5) longer than broad, with distinct groove; foot-fringe yellowish-brown, darker posteriorly; foot-sole yellowish-brown, with median and lateral planes sharply marked. Rugæ large. Keel prominent. Length (in alcohol) 20 mm.

Shell very fragile, consisting of a series of small calcareous particles indefinitely arranged, the general form being as shown in Fig. 6. Length 3, breadth 2 mm.

Hab.—Haleakala, Maui, 5,000 feet, and Olaa to Kilauea, 2,000 to 4,000 feet (one specimen).

Anatomy.—The free-oviduct is a short tube, from one side of which there is a small oval-shaped diverticulum. The penis commences as a thin tube, expanding into a globose sac, beyond which it exhibits a number of constrictions, and terminates abruptly, giving place to the vas deferens, which passes off as a short fine tube. There is a large bilobed accessory gland (Fig. 4, *ac.gl.*) attached to the commencement of the free-oviduct by seven fine ducts, immediately above which the pyriform receptaculum seminis opens; its duct is short,

and the head expanded. The oviduct is short and bent upon itself, thus ∞ (Fig. 4, *ov.*). The albumen gland is very large. The hermaphrodite duct and gland are both small.

Externally the species is not unlike a small example of *A. ater*, Cllge., and differs only from dark forms of *A. gagates*, Drap., in its prominent keel.

I have much pleasure in associating with this species the name of Mr. J. F. Baber, of the Institute of Comparative Embryology, in the University of Prague.

2. AGRIOLIMAX LEVIS, Müll.

Small collection from Lihue, Kauai (2,000 feet), and from Haleakala (5,000 feet).

3. AGRIOLIMAX BEVENOTI, n.sp.

In a collection of specimens from Kauai (4,000 feet), Honolulu (2,000 feet), and another from Haleakala (5,000 feet), Mr. Perkins sends a large number of small specimens of *Agriolimax*. I have dissected a number of these, and for some time was very doubtful whether or not to remove any of them from *A. levis*. Dr. Simroth has very kindly examined some of these and given me his opinion upon them: he thinks the species is scarcely distinguishable, and that these specimens are nearly related to *A. levis*, Müll., and *A. campestris*, Binney, from North America, *A. hyperboreus*, Wstr., from Behring Strait, and *A. agrestis*, L., from Northern Siberia.

I have made a careful examination of this material, and, as previously stated, I think there are sufficient reasons for separating some of these specimens from any of the above-mentioned forms. I have, therefore, named those from Kauai (4,000 feet) *A. Bevenoti*, after my colleague Professor Clovis Bévenot, to whom I am much indebted for the assistance he has so often given me with regard to Italian malacological literature.

Animal not unlike *A. levis*, Müll., but slightly darker in colour. Length (in alcohol) 16 mm.

Anatomy.—The only parts of the reproductive organs which I have been able to clearly make out are the form of the free-oviduct and receptaculum seminis. In the three specimens dissected this latter organ was always folded, as shown in Fig. 9, *r.s.*, and the free-oviduct showed two small pouch-like diverticula. The reproductive organs were, unfortunately, not in a very mature condition.

4. TEBENNOPHORUS STRIATUS, Hasselt.

There are numerous examples of this species collected at Honolulu (2,000 feet), and Lihue, Kauai (2,000 feet).

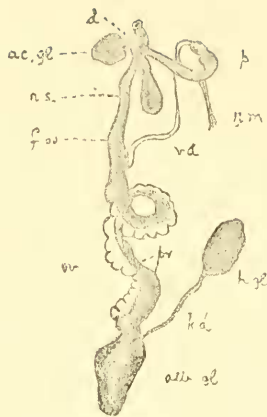


Fig 1

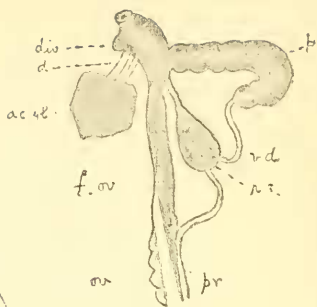


Fig. 2

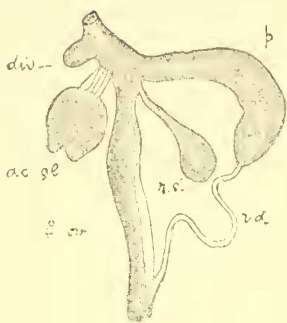


Fig 3

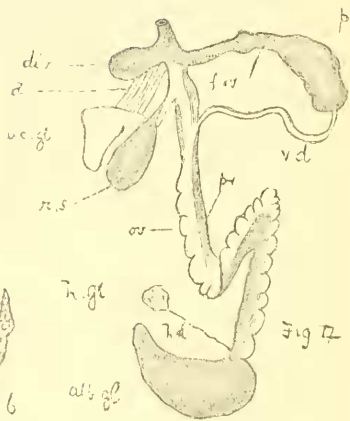


Fig 4

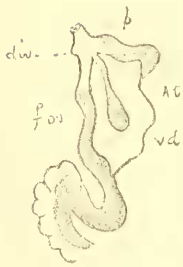


Fig. 7

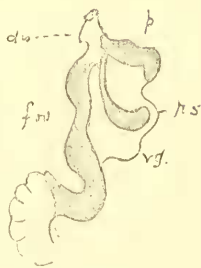


Fig 8.

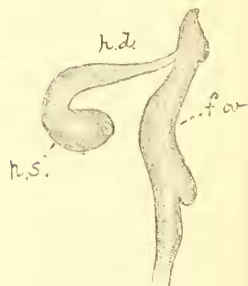


Fig 9.

- FIG. 1. *Amalia gagates*, Drap. Generative organs.
 ,, 2. } *Amalia gagates*. Showing variations in the form of the terminal ducts,
 ,, 3. | particularly the gradual lengthening of the penis.
 ,, 4. *Amalia Babori*, n.sp. Generative organs.
 ,, 5. *Amalia Babori*. Mantle.
 ,, 6. *Amalia Babori*. Shell.
 ,, 7. *Agriolimax levis*, Müll. Portion of the generative organs.
 ,, 8. *Agriolimax levis*. Showing variation in the form of the receptaculum
 seminis, *r.s.*
 ,, 9. *Agriolimax Bevenoti*, n.sp. Terminal ducts of the generative organs.

LETTERING.

ae.gl.	accessory gland.	ov.	oviduct.
alb.gl.	albumen gland.	p.	penis.
d.	ducts of accessory gland.	pr.	prostate.
div.	diverticulum.	r.d.	receptacular duct.
f.ov.	free-oviduct.	r.m.	retractor muscle of penis.
h d.	hermaphrodite duct.	r.s.	receptaculum seminis.
h.gl.	hermaphrodite gland.	v.d.	vas deferens.